NATIONAL RECONNAISSANCE OFFICE

Schedule Assessment Initiatives at NRO

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NRO Cost and Acquisition Assessment Group (CAAG) provides data, tools and methods to improve acquisition outcomes for innovative overhead intelligence systems

CAAG Hallmarks

Workforce

Technical Career Field - Engineers, Mathematicians, Ops Research Analysts

Transition to CADRE: Stable, Sustainable

Development positions: Pipeline, Long term organizational health

Central Management of NRO Cost Estimating and IPM Contractors - TAP

Data & Tools

EVM Central Repository: Improves quality/ transparency, allows Enterprise analysis

CAAG Data Management System (CDMS): Home for ~250 programs (NRO/others)

Empower transition: modernizing EVM and Schedule analysis; Transitioning to IPMDAR

Outreach

Strong participation in Cost and IPM collaboration forums: Cost IPTs, Joint Space Cost Council, National Defense Industrial Association, Agile working group, Schedulers Forum, Military Operations Research Society

Recent emphasis on Realistic Cost Estimates (RCE) in Source Selections

Methods/Research

Innovative IPM approaches to determine leading indicators

Over 125 cost methods – continuous improvement through updates and research

Exploration into new techniques – data sciences, machine learning, advanced visualizations

Schedule Assessment Initiatives strengthen the NRO CAAG IPM Team's schedule analysis

Initiatives in this Briefing:

Schedule Execution Metrics
– including new visualization of schedule slip over time and application in the business rhythm with emphasis on predictive trends

Schedule Risk Assessment Gap Analysis
–themes from recent SRAs and recommendations for focused areas of improvement in accuracy and repeatability

Schedule Metrics Update

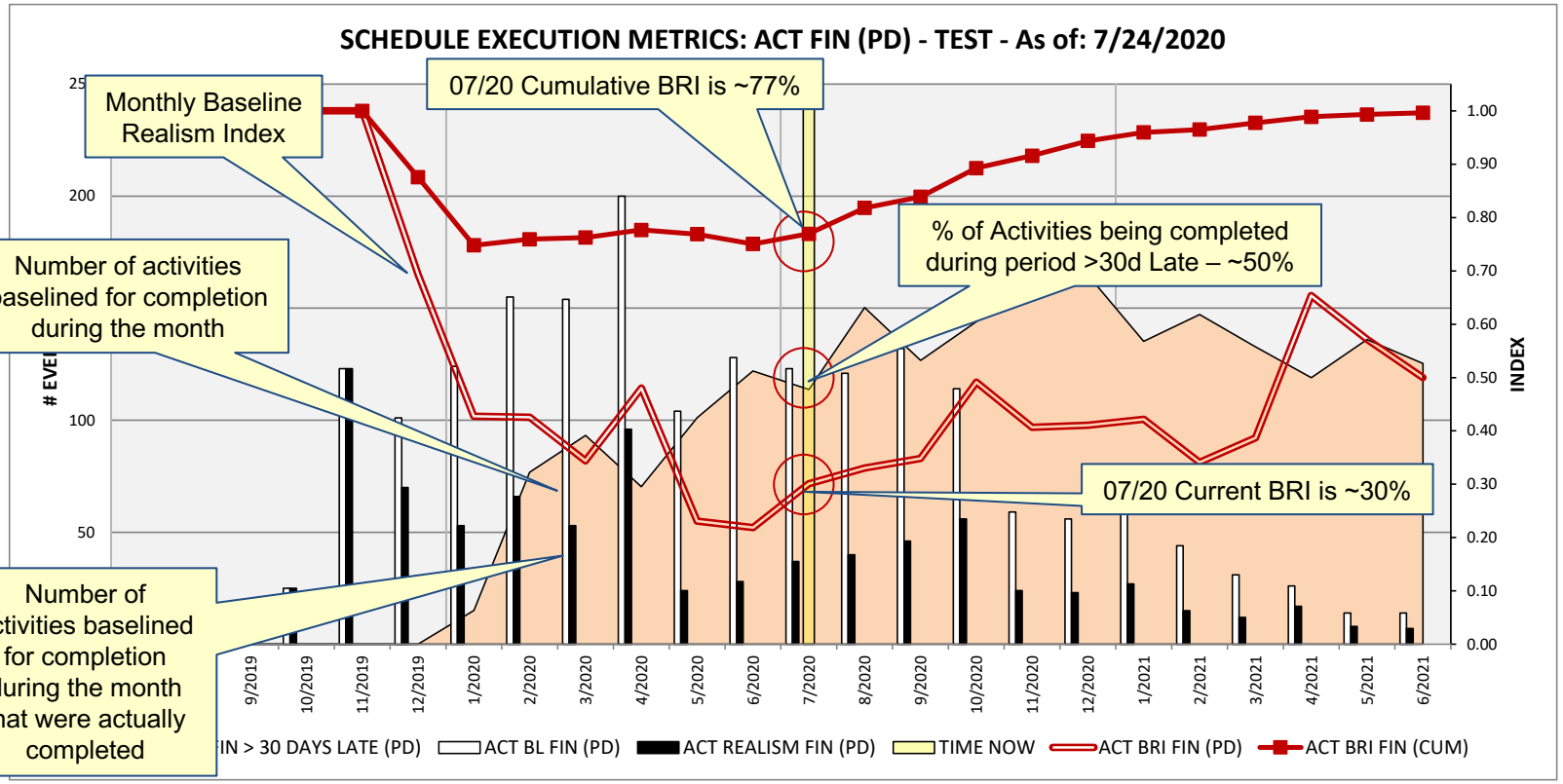
- NRO maintains corporate toolset for consistent metrics calculations
  - Is the work being performed as planned?
  - Are resources being expended to accomplish backlog?
  - How reliable is the forecast?

- Continues to update data visualizations to meet needs and incorporate new ideas
  - How do this period's metrics compare to a previous period?

- The following slides provide some recent examples used for program assessment and program recovery

Baseline Realism Index (BRI)

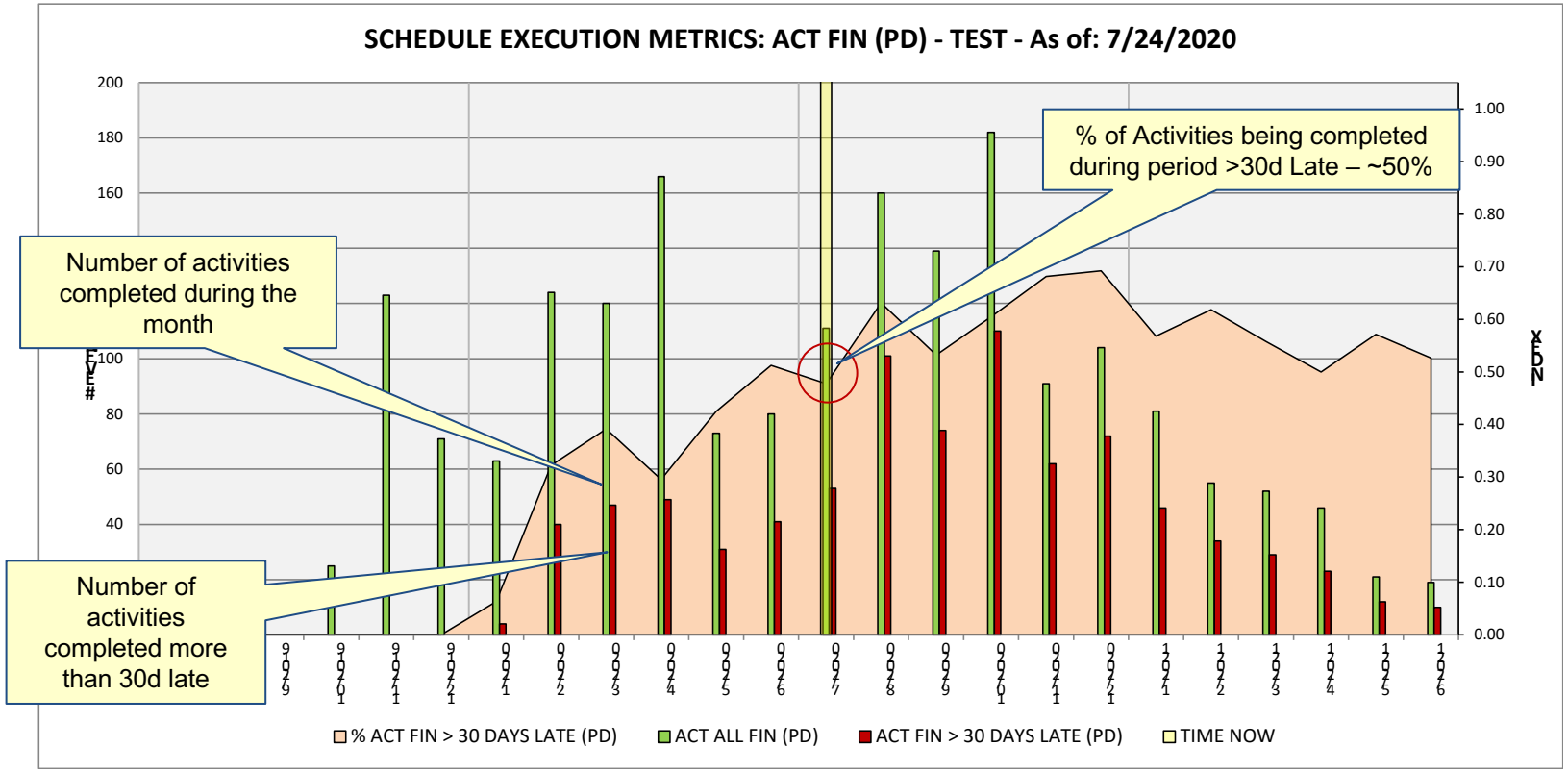
Tabular data is also available for more data to support each of these metrics



Interpretation: The trend of activities completed of those that were baselined for completion completed has been dropping regularly since 11/19. During that same time frame, the percentage of completions >30d late (compared to total completions in the month) has a slight dip in 07/20 but has a projected uptick in 08/20

Management Value: the downward trend and low level of BRI leads to questions as to whether the plan is achievable

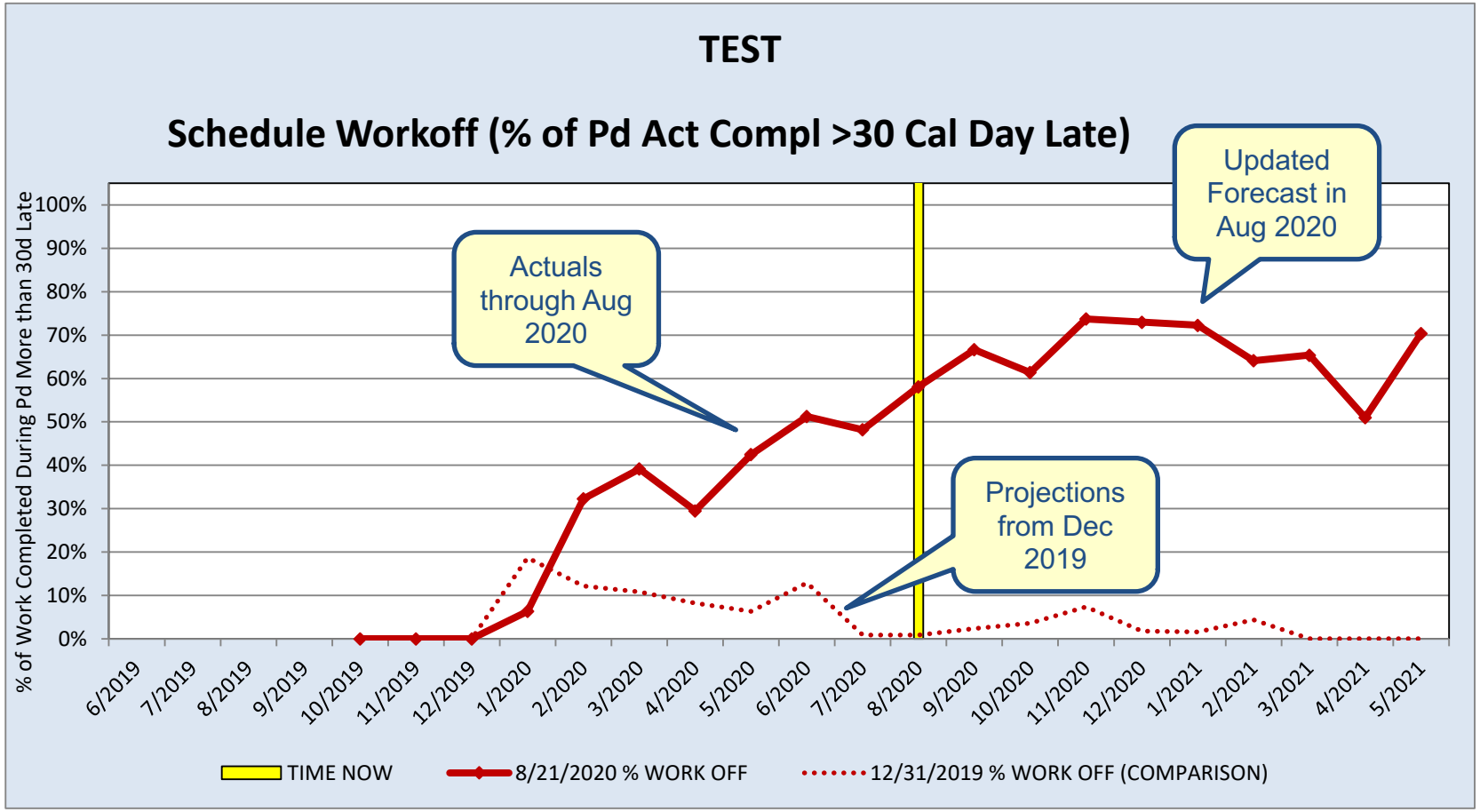
Schedule Workoff



Interpretation: This view shows the numbers behind the mountain chart on the previous slide – During the next 12 months, the majority of completions will be more than 30 days late

Management Impact: early indication that the program will need resources (cost, time) to work off late tasks

Schedule Workoff, changes over time



Interpretation: The percentage of activities completed each month >30d late is significantly higher in Aug 2020 than was projected in Dec 2019 – Future shows growth compared to Aug 2020 data

Management Impact: visualizing the increase in level of schedule workoff shifts focus of program management review to late tasks that keep slipping, to resolve barriers to completion

Next Steps in Schedule Execution Metrics

- Schedule Execution Metrics are in use in program offices and for independent assessments
- Continual tool enhancement
- Ongoing studies to use historic data for more predictive value

(U) Contractor SRA Gap Introduction

- A Schedule Risk Assessment (SRA) is a very good simulation tool for assessing a schedule's time to complete
  - Based on estimate (duration) uncertainty
  - Uses duration inputs as Probability Distribution Functions (PDF)
  - Results are only as good as the inputs
- There are some gaps in current industry practice

1. Adequate documentation of duration uncertainty factors
2. Use of Risk register consequences into SRA inputs
   - From the PASEG v3 2019, tasks should be identified for risk mitigation steps. There is no mention of impact assessment used in a SRA

PASEG - Planning & Scheduling Excellence Guide (NDIA)
NDIA – National Defense Industrial Association

Gap 1: Duration Factors for SRA Inputs

Observation

- Triangle factors vary widely in SRAs with opportunities to improve substantiation of basis
  - Historical data reference
  - Basis of estimate or justification of factors
  - Standards, studies, or research available

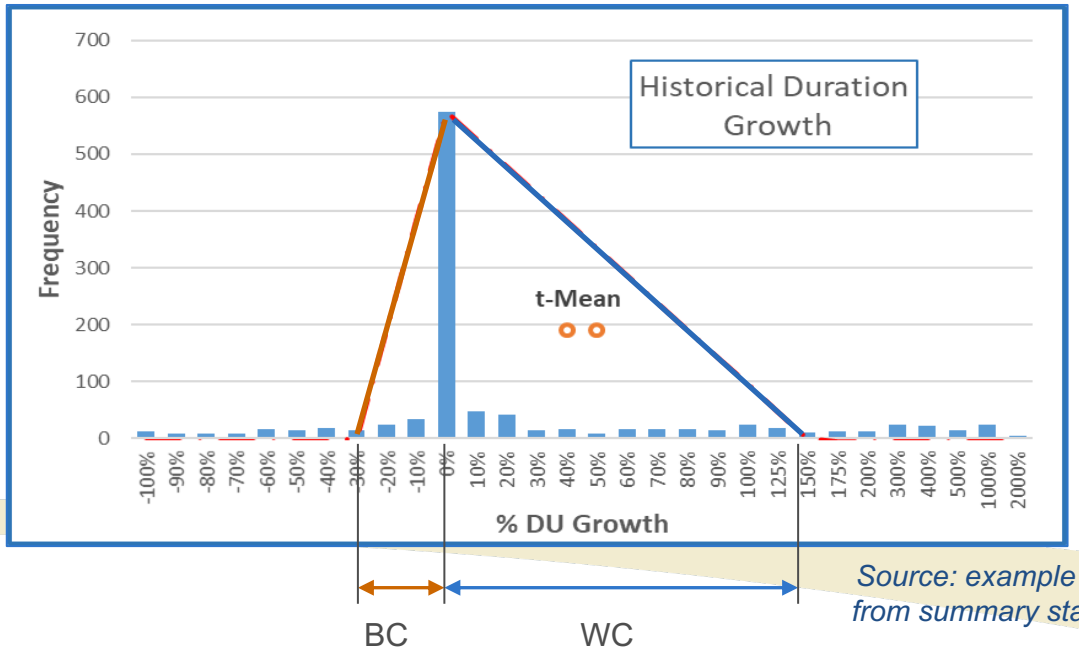
Recommendation

- Use historical IMS data to develop best case and worst case factors for triangle PDFs
- Areas for additional study: WBS elements or tasks of like kind will have different factors

Are current SRA inputs calibrated to historical performance?

Example: Are inputs with 0% - 3% duration growth used when historical performance is significantly higher

Typical IMS Duration Growth Analysis



Source: example of derived data from summary statistical analysis

Gap 2: Risk Integration

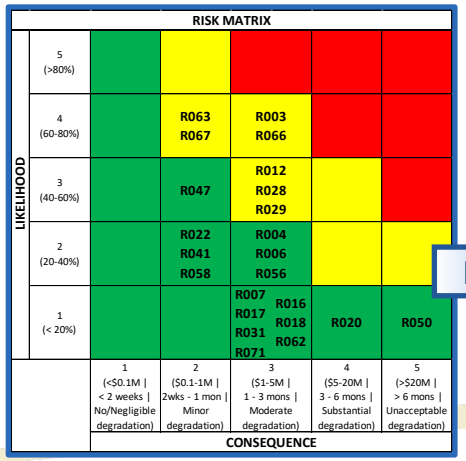
Observation

- The risk register cost impacts flow into the EAC, but how are schedule consequences modelled in the SRA?
- IMS tasks sometimes mapped to risks
  - Modeling approach of impacts
  - Rarely implemented, mitigation steps only

Recommendation

- Risk register data should include schedule impacts
- Risks milestones can be integrated into the IMS
  - Will not impact the deterministic schedule critical path
- Simulation will assess the impacts during the SRA
  - Task existence = Likelihood
  - Consequence = Uniform PDF duration

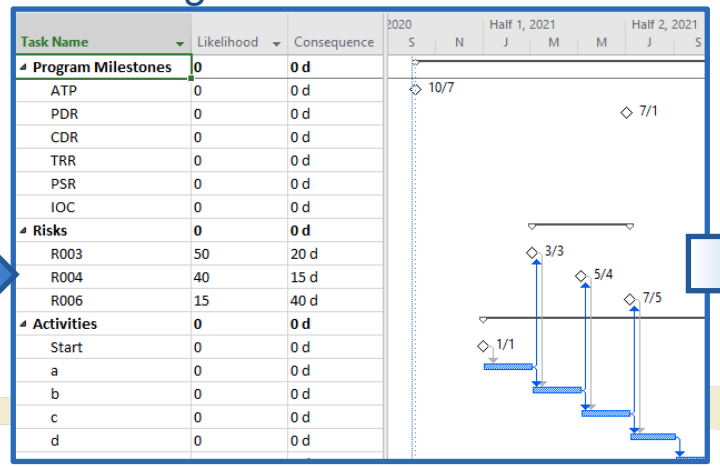
Risk Register



Integrate

Risk Integrated IMS

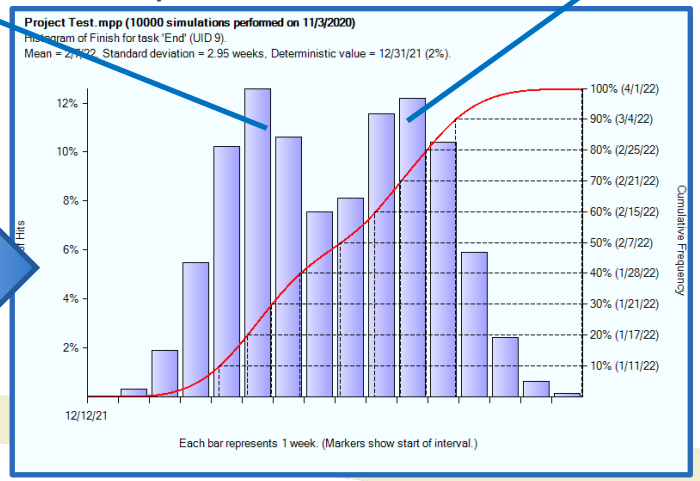
Duration Uncertainty



Impacts

Risk Impacted SRA

Risk Register



SRA Gap Summary

- Spacecraft schedules have inherent risk and require critical path management
  - The sufficiency of schedule margin to mitigate schedule impacts

Gap	Action
① Adequate documentation of duration uncertainty factors	Use of historical data to determine duration uncertainty factors
② Use of Risk register consequences into SRA inputs	Integration of risk register consequences into the SRA

Closing SRA gaps may lead to better schedule predictability